AIR FORCE SPECIALTY CODE 4B051 BIOENVIRONMENTAL ENGINEERING
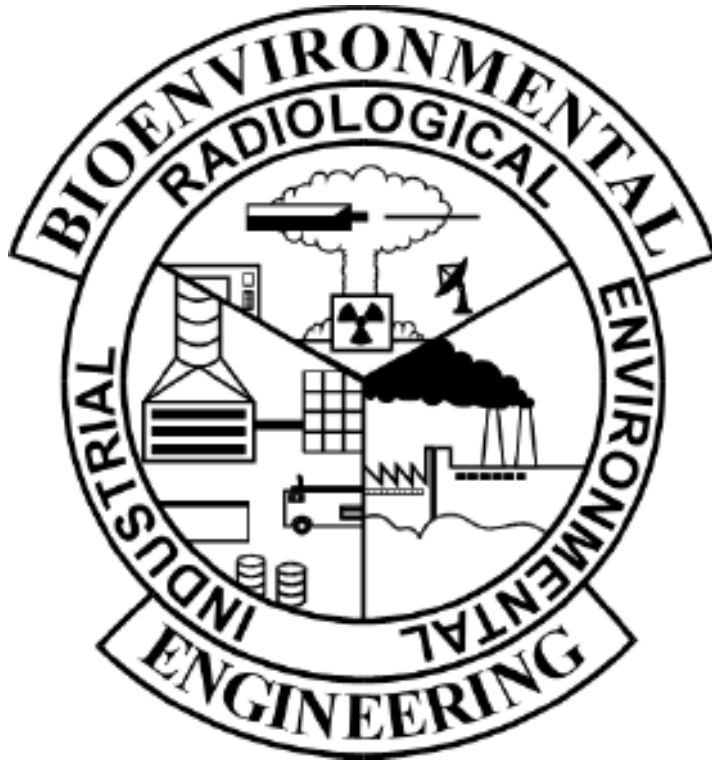
Response Operations

QUALIFICATION TRAINING PACKAGE

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STS Line Item 5.2.2: Input and interpret risk assessment tools / dispersion models (i.e. CHEMRAT, CHART or equivalent)

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	None
Training References:	• Chemical Hazard Estimation Method and Risk Assessment Tool (CHEMRAT), Phase One User's Manual, 2003. https://hpws.afrl.af.mil/dhp/OE/ESOHSC/pages/index.cfm?id=680&admin • Chemical, Biological, Radiological, and Nuclear (CBRN) Health Assessment and Risk Tool (CHART) User Guide, 2007. https://hpws.afrl.af.mil/dhp/OE/ESOHSC/pages/index.cfm?id=680&admin
Additional Supporting References:	None
CDC Reference:	4B051
Training Support Material:	• After Action Report for Chemical Release or Exercise Scenario • CHEMRAT and CHART computer program
Specific Techniques:	Conduct hands-on training and evaluation of interpretation of air sampling results to compare with applicable standard.
Criterion Objective:	Given a scenario input hazards into a risk assessment tool and interpret the results, successfully completing all checklist items with limited trainer assistance on only the hardest parts.
Notes: The CHART program and its companion, the Chemical Hazard Estimation Method and Risk Assessment Tool (CHEMRAT), are very useful references for assessing hazards and estimating hazard duration during CBRN incidents, particularly chemical warfare agent attacks. These tools are available at the USAFSAM ESOH Service Center website.	

TASK STEPS

Input and Interpret Data in CHART:

1. Select the agent of concern from the drop-down list in STEP 1 within CHART.
2. Input temperature data in STEP 2.[1]
3. Input exposure concentration in STEP 3.[2]
4. Select the appropriate detection limit in STEP 3a.[3]
5. Input estimated exposure duration in STEP 4.[4]
6. Click "Calculate Risk" button to generate Chemical Health Risk Assessment Data.
7. Interpret risk assessment data using CHART User Guide.
8. Communicate health risk assessment data to appropriate decision makers/CCs/potentially affected members.

Input and Interpret Data in CHEMRAT:

1. Select agent of concern from the drop-down list in CHEMRAT.[5]
2. Select whether the agent is viscosity ("Neat" or "Thickened")[6] based on intel from drop down list.
3. Determine the type of weapon system (i.e. TBM Air, TBM Ground, or a specific TBM that may target the operating area).[7]
4. Select the estimated number of in-bound TBMs or TBMs causing agent deposition.
5. Select appropriate target area.[8]
6. Input the appropriate surface (i.e. asphalt, concrete, or sand).
7. Obtain temperature, wind and stability, using appropriate conversions.[9]
8. Area coverage – set to "Peak."[10]
9. Set exposure duration initially to 1 hour (matches persistency table).[11]
10. Select protection level.[12]
11. Interpret risk assessment data using Chemical Hazard Estimation Method and Risk Assessment Tool (CHEMRAT) user's manual and Hazard Duration Estimate Using CHEMRAT checklist.[13]
12. Communicate health risk assessment data to appropriate decision makers/CCs/potentially affected members.

LOCAL REQUIREMENTS: Develop scenario with exercise inputs for CHEMRAT tool.

NOTES:

1. The default temperature unit of measure is Fahrenheit. This is indicated by a check in the box labeled "Check for Degrees F." Selected agents have toxicity estimates for Percutaneous Vapor exposure under hot and moderate temperatures. Hot temperatures are defined as greater than 85 degrees F. Moderate temperatures are defined as 65 to 85 degrees F. In general, as the temperature increases, the effective Percutaneous Vapor dosage decreases. CHART will use the temperature input to determine the appropriate toxicity values to calculate and display.

2. Determining the concentration of a particular chemical warfare agent in the environment is limited by the equipment technologies employed. The default unit of measure is milligrams per cubic meter. If parts per million (ppm) are to be used, indicate by a check in the box labeled "Check for ppm Units." There are several methods of determining the concentration, to include a measured concentration; a concentration equal to the detection limit of

a particular piece of equipment; and a concentration generated from a CHEMRAT prediction.

3. CHART is populated with detection limits for various equipment and operating modes. These detection limits are known for the agent selected in Step 1. To use this section, select the Equipment/Method by placing the cursor over the applicable equipment and clicking the left mouse button. The Published Detection Limit for Selected Agent value will appear in the right hand column.

4. This is the anticipated time for an ***unprotected*** airman to accomplish a task that demands a reduction in the MOPP level. The unit of measure is minutes for all inputs.

5. Select the agent(s) used in the attack. Possible choices are: "GB&GF", "GD", "GF", "HD", and "VX". If multiple agents are used, examine each case and result separately. For "GB&GF", CHEMRAT assumes the tactical ballistic missile (TBM) carries both agents.

6. Possible chemical choices are: "GB&GF", "GD", "GF", "HD", and "VX". If multiple agents are used, examine each case and result separately. For "GB&GF", CHEMRAT assumes the tactical ballistic missile (TBM) carries both agents.

7. Number of weapons default = 1 unless you receive specific reports of multiple explosions in same sector.

8. From this menu, the user can select an area size or a specific air base. This version of CHEMRAT contains two specific air bases, listed as AB1 and AB2, and two generalized base sizes: small and large. A separate Appendix C contains the identification key that ties specific weapon systems to specific air bases.

    - Small base = 3 km (downwind) $\times$ 1 km (crosswind)
    - Large base = 5 km (downwind) $\times$ 3 km (crosswind)
    - HINT – Always choose "SMALL

9. The choices are 10 °C (50 °F), 20°C (68 °F), 30 °C (86 °F), and 40 °C (104 °F). If the area temperature falls between two temperature ranges, evaluate both temperatures and compare the results. Select the temperature that presents the worst-case results.

    Select the wind speed closest to forecast or actual conditions. If the current wind speed falls between two wind speed ranges, evaluate both wind speeds and compare the results. Select the wind speed that presents the worst-case results.

    Wind Speed and Stability Categories

Wind Speed	**Stability Category**
1 m/s (3.6 km/h)	F (Stable)
3 m/s (10.8 km/h)	D or F
5 m/s (18.0 km/h)	D (Neutral)

10. This represents the concentration in the grid receiving the most contamination. Use 99 and 95 if you have the time, but if the results are more than 10x lower than peak, use peak for all VLS-Track plume area. (ref pp 19-20 of policy ltr and p 17 of CHEMRAT guidance for background).

11. For subsequent attacks, consider lengthening exposure time to estimate total length of exposure (if people will be in both places). Or, if performing risk assessment for a particular task, enter the expected duration of that task (for example, sortie generation will take 2 hours).

12. To estimate inhaled exposure risk if MOPP reduced to MOPP 0-2, select "Inhaled" and "None." To estimate percutaneous risk, select "PercVapor" and "None." For G series agents, the percutaneous vapor penetration is relatively low (90% inhalations vs. 10% dermal). VX, however, is 50% inhaled and 50% dermal.

13. CHEMRAT User's Manual and Checklist and Hazard Duration Estimate Using CHEMRAT checklist are located at the following link - https://hpws.afrl.af.mil/dhp/OE/ESOHSC/pages/index.cfm?id=680&admin

TRAINEE REVIEW QUESTIONS

STS Line Item 5.2.2: Input and interpret risk assessment tools / dispersion models (i.e. CHEMRAT, CHART or equivalent)

1. What are the two exposure types for CHEMRAT under the Risk View?

2. What type of agent is CHEMRAT designed to be used for?

3. What law is the CHART CWA calculations based on?

4. If personnel are in MOPP 2 what is the exposure type and protection in CHEMRAT.

5. "Mild effects following inhalation/ocular exposure include miosis, rhinorrhea, and tight chest." These are describing what type of effect in CHART?

PERFORMANCE CHECKLIST

STS Line Item 5.2.2: Input and interpret risk assessment tools / dispersion models (i.e. CHEMRAT, CHART or equivalent)

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…	YES	NO
INPUT AND INTERPRET DATA IN CHART		
1. Select the agent of concern from the drop-down list in STEP 1 within CHART?		
2. Input temperature data in STEP 2?		
3. Input exposure concentration in STEP 3?		
4. Select the appropriate detection limit in STEP 3a?		
5. Input estimated exposure duration in STEP 4?		
6. Click "Calculate Risk" button to generate Chemical Health Risk Assessment Data?		
7. Interpret risk assessment data using CHART User Guide?		
8. Communicate health risk assessment data to appropriate decision makers/CCs/potentially affected members?		
INPUT AND INTERPRET DATA IN CHEMRAT		
1. Select agent of concern from the drop-down list in CHEMRAT?		
2. Select whether the agent is viscosity ("Neat" or "Thickened") based on intel from drop down list?		
3. Determine the type of weapon system (i.e. TBM Air, TBM Ground, or a specific TBM that may target the operating area)?		
4. Select the estimated number of in-bound TBMs or TBMs causing agent deposition?		
5. Select appropriate target area?		
6. Input the appropriate surface (i.e. asphalt, concrete, or sand)?		
7. Obtain temperature, wind and stability, using appropriate conversions?		

8. Area coverage – set to "Peak"?		
9. Set exposure duration initially to 1 hour (matches persistency table)?		
10. Select protection level?		
11. Interpret risk assessment data using Chemical Hazard Estimation Method and Risk Assessment Tool (CHEMRAT) user's manual and Hazard Duration Estimate Using CHEMRAT checklist?		
12. Communicate health risk assessment data to appropriate decision makers/CCs/potentially affected members?		
Did the trainee successfully complete the tasks?		

_____   _____

TRAINEE NAME (PRINT)   TRAINER NAME (PRINT)

ANSWERS

1. What are the two exposure types for CHEMRAT under the Risk View?

    A: Inhaled and Percutaneous Vapor.

    (Source: Chemical Hazard Estimation Method and Risk Assessment Tool (CHEMRAT), Phase One User's Manual, 2003, AFRL, para 3.2.11.)

2. What type of agent is CHEMRAT designed to be used for?

    A: Chemical Warfare Agents

    (Source: 4B051 CDC)

3. What law is the CHART CWA calculations based on?

    A: Haber's Law

    (Source: 4B051 CDC and Chemical, Biological, Radiological, and Nuclear (CBRN) Health Assessment and Risk Tool (CHART) User Guide)

4. If personnel are in MOPP 2 what is the exposure type and protection in CHEMRAT.

    A: Exposure type: Inhaled
            Protection: None

    (Source: Chemical Hazard Estimation Method and Risk Assessment Tool (CHEMRAT), Phase One User's Manual, 2003, AFRL)

5. "Mild effects following inhalation/ocular exposure include miosis, rhinorrhea, and tight chest." These are describing what type of effect in CHART?

    A: Threshold

(Source: Chemical, Biological, Radiological, and Nuclear (CBRN) Health Assessment and Risk Tool (CHART) User Guide, 2007)

STS Line Item 5.2.3: Use emergency management response plans and checklists

TRAINER GUIDANCE

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.
Prerequisites:	None
Training References:	• AFI 41-106, *Medical Readiness Program Management*, 22 April 2014. May differ as updates occur • AFMAN 10-2502, *Air Force Incident Management System (AFIMS) Standards and Procedures,* September 2011. May differ as updates occur. • AFI 10-2501, *Air Force Emergency Management Program Planning and Operations*, 24 January 2007. Corrected 10 May 2013 and may differ as updates occur. • AFMAN 10-2504, *Air Force Incident Management Guidance for Major Accidents and Natural Disasters,* 13 May 2013 and may differ as updates occur. • Installation Emergency Management Plan (IEMP), Locally Developed. • Medical Contingency Response Plan (MCRP), Annex F, Locally developed. • Locally developed BE checklists referenced in MCRP.
Additional Supporting References:	• BE Field Manual • AFDD 3-40, *Counter-Chemical, Biological, Radiological and Nuclear Operations*, 26 January 2007. Last Reveiw 1 November 2011. • AFTTP 3-42.32, *Home Station Medical Response to Chemical, Biological, Radiological, and Nuclear Incidents*, 2013.
CDC Reference:	4B051
Training Support Material:	• Exercise Scenario • Local BE Response Checklists
Specific Techniques:	Conduct hands-on training and evaluation on use of emergency management plans and checklists
Criterion Objective:	Given a response scenario, use proper emergency response plans and/or checklists, successfully completed all checklist items with limited trainer assistance on only the hardest parts.

Notes:

Good planning can provide BE personnel with the information they need to handle most emergency responses they will support, but there are also many materials and sources BE personnel will bring with them or use during an incident response. The installation's IEMP 10-2, the medical contingency response plan, and other supporting BE checklists are critical for any response to ensure that during the confusion and stress of an incident response, critical equipment, procedures, and information needed to accomplish incident response missions are not forgotten.

TASK STEPS

1. Familiarize/review local emergency management response plans (i.e. IEMP 10-2, MCRP) and BE specific checklists frequently.
2. During emergency response situations ensure BE assets are activated through appropriate communication channels (i.e. Medical Readiness).
3. Upon notification, locate local emergency management response plans and BE specific checklists.
4. Depending on the stage of the response and situation, select appropriate checklist(s) for the emergency response scenario[1].
5. Properly execute checklist(s) requirements/line items as required.
6. Upon completion of response, review/scrub/hotwash local emergency management response plans and BE specific checklists for improvements opportunities/shortfalls.

LOCAL REQUIREMENTS: Locally developed exercise scenario.

NOTES:

1. Trainer will develop a scenario that will require the use of a locally developed checklist.

TRAINEE REVIEW QUESTIONS

STS Line Item 5.2.3: Use emergency management response plans and checklists

1. Each installation unit must use the _____ to develop unit-specific checklist to support the IEMP 10-2?

2. What plan is used for establishing plans for installation medical capabilities to respond to contingencies and support recovery?

3. What annex in the MCRP outlines support provided by the BE team?

4. Would one checklist be sufficient to cover all potential response scenarios?

5. Checklist should be limited to _____ that aid in performing essential tasks?

PERFORMANCE CHECKLIST

STS Line Item 5.2.3: Use emergency management response plans and checklists

Proficiency Code:	2b
PC Definition:	Can do most parts of the task. Needs help only on hardest parts. Can determine step-by-step procedures for doing the task.

DID THE TRAINEE…		YES	NO
1. Familiarize/review local emergency management response plans (i.e. IEMP 10-2, MCRP) and BE specific checklists frequently?			
2. During emergency response situations ensure BE assets are activated through appropriate communication channels (i.e. Medical Readiness)?			
3. Upon notification, locate local emergency management response plans and BE specific checklists?			
4. Depending on the stage of the response and situation, select appropriate checklist(s) for the emergency response scenario?			
5. Properly execute checklist(s) requirements/line items as required?			
6. Upon completion of response actions, review/scrub/hotwash local emergency management response plans and BE specific checklists for improvements opportunities/shortfalls?			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT)   TRAINER NAME (PRINT)

ANSWERS

1. Each installation unit must use the _____ to develop unit-specific checklist to support the IEMP 10-2?

   A: IEMP 10-2.

   (Source: AFI 10-2501, *Air Force Emergency Management (EM) Program Planning and Operation,* 10 May 2013)

2. What plan is used for establishing plans for installation medical capabilities to respond to contingencies and support recovery?

   A: Medical Contingency Response Plan (MCRP)

   (Source: AFMAN 10-2502, *Air Force Incident Management System (AFIMS) Standards and Procedures,* September 2011)

3. What annex in the MCRP outlines support provided by the BE team?

   A: Annex F.

   (Source: AFI 41-106, *Medical Readiness Program Management*, 22 April 2014)

4. Would one checklist be sufficient to cover all potential response scenarios?

   A: No

   (Source: 4B051 CDC)

5. Checklist should be limited to _____ that aid in performing essential tasks?

   A: Reminders

   (Source: 4B051 CDC)